

# Medicina Station Status Report

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**Abstract** General information about the Medicina Radioastronomical Station, the 32-m antenna status, and the VLBI observations are provided. Updates to hardware and software infrastructure have been made and are briefly described.

## 1 The Medicina 32-m Antenna: General Information

The 32-m Medicina antenna is located at the Medicina Radioastronomical Station. The station is managed by the Institute of Radio Astronomy and is located about 33 km east of Bologna. The National Research Council was the funding agency of the Institute of Radio Astronomy until the end of 2004. Since 1 January 2005, the funding institution has been the National Institute for Astrophysics (INAF).

The antenna, inaugurated in 1983, has regularly taken part in IVS observations since 1987 and is a member of the European VLBI Network.

A permanent GNSS station (MEDI) is installed nearby, which is part of the IGS network. Another GNSS system (MSEL) is installed near the VLBI telescope and is part of the EUREF network. The observatory is therefore a co-location geodetic site, contributing to the realization of the ITRF.

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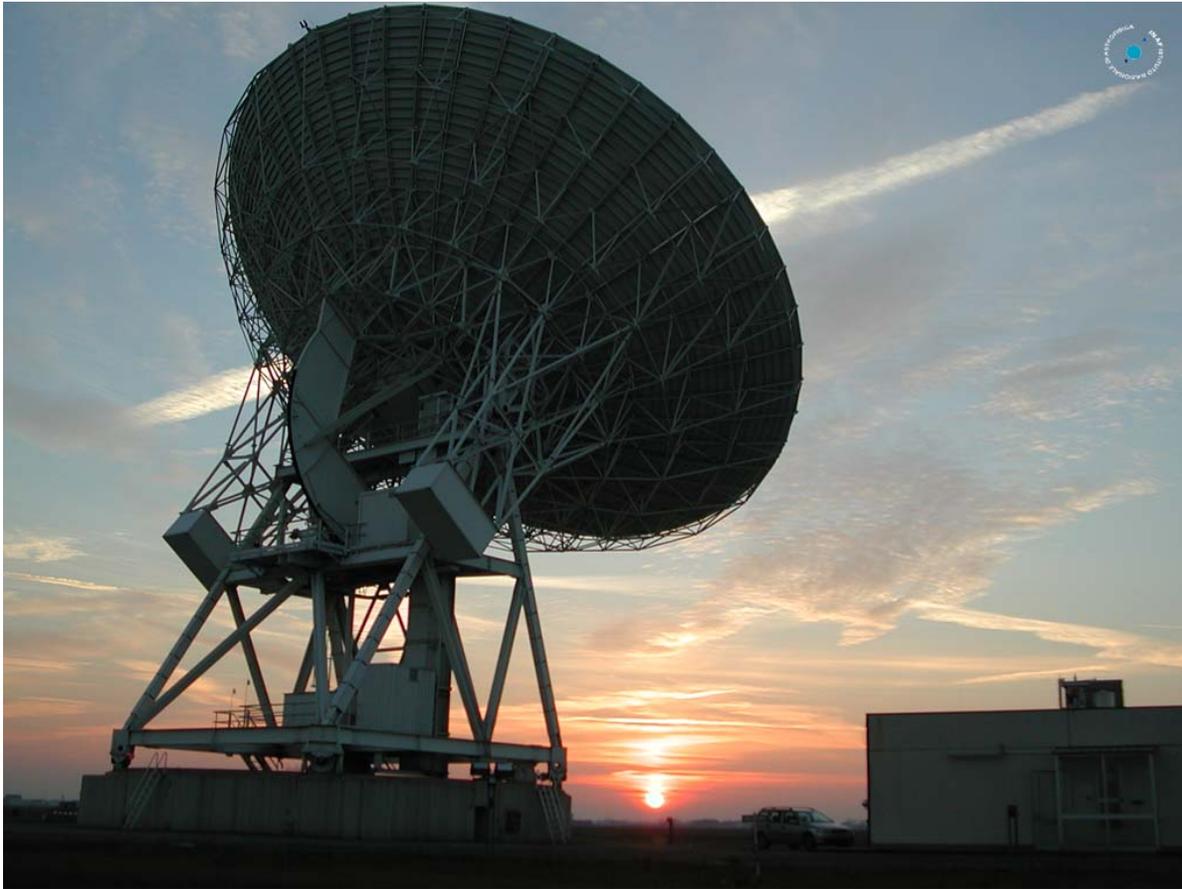
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Medicina Network Station

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## 2 Current Status and Activities

- **Antenna:** An active surface system for the primary mirror of Medicina was funded and the works are in progress:
  - The new aluminum panels were delivered, showing a manufacturing accuracy of  $< 65 \mu\text{m}$ .
  - A new subreflector is in progress; its manufacturing accuracy is foreseen to be  $< 50 \mu\text{m}$ .
  - All of the parts for constructing 244 electro-mechanical actuators are under delivery and the assembling completion is foreseen for summer 2023. Once completed, Medicina will be able to observe at high frequencies up to 116 GHz with good overall efficiency.
- **Receivers:** In 2019, INAF was awarded a call (PON, National Operational Program) issued by the Ministry of Research. As part of this funding, our institute requested the installation on the Medicina radio telescope of a simultaneous tri-band receiver (18–26, 34–50, 80–116 GHz). The receiver was delivered in summer 2022.
- **VLBI backend:** A new DBBC3 backend was delivered and tested with the FS 10.1.0-beta2 version. A new FlexBuff was installed and configured: we can record at 4 Gbps.
- **Field System:** (a) On the FSL10 Debian machine, we are running the FS 10.0.0. (b) The Continuous\_cal system is working for the Cassegrain receivers (6, 5, and 1.3 cm) and since 2/2019 is available also for primary focus receivers (3.6 and 18/21 cm).



**Fig. 1** The 32-m Medicina antenna.

### 3 Geodetic VLBI Observations

In 2021 and 2022, Medicina participated in 52 routine geodetic sessions (28 and 24 sessions, respectively): three IVS-R1, 34 IVS-R4, four IVS-T2, one IVS-CRF, and ten R&D experiments.

technique is innovative to overcome the obstacles imposed by current clock comparison techniques in terms of cost and feasibility. Broadband VLBI observations were carried out between October 2018 and February 2019. The small antenna is expected to return to Japan in 2023.

### 4 Transportable NICT VLBI Antenna

Since 2018, Medicina Observatory has hosted a 2.4-m antenna designed and built by NICT to carry out broadband VLBI measurements with the aim of comparing optical clocks on an intercontinental basis. This